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Retrospective Study of Lumpy Skin Disease Cases in West Belesa District, Amhara Region, Ethiopia

[1]Samuel Engdaw, [2]Bayisa Kenaw, [3]Lakech Tebebu and [4]Getachew Gari

[1]Animal Health Expert at West Belesa District, Amhara, Ethiopia
[2]Veterinary Epidemiologist at Bureau of agriculture Benishangul Gumuz region Assosa, Ethiopia
[3]Veterinary Epidemiologist at Ministry of Agriculture Addis Ababa, Ethiopia
[4]Veterinary Epidemiologist at Food and Agricultural Organization Addis Ababa, Ethiopia

Abstract: Background: Ethiopia have the largest livestock population in Africa. Cattle production is one of the major agricultural industries that play very important roles in food security of the people. Lumpy skin disease (LSD) is one of the major disease constraints for the inefficient use of these animals. This study was performed with the objectives of investigating and analyzing the spatial and temporal distribution of LSD and the risk factors. Methodology: A retrospective surveillance was conducted on cattle for the period 2017 to 2021 in West Belessa District. Data was collected from clinic case books, monthly reports and monthly outbreak report form. Data analysis using descriptive statics was performed by Microsoft Excel. Results: An overall prevalence of LSD suspected cases were 306 (0.5%) from the total of 61276 cases diagnosed in 32 animal health centers and the mortalities were 7 animals out of 306 (2.28%). The risk factors were sex, age, season, management system and study site. Accordingly, female cattle were highly infected 55.6% (170) than males 44.4% (136). The infected adults 231(69.6%) were higher than Youngs 90 (30.4%). Animals managed under semi-intensive systems were more affected 249 (18.6%) than extensively managed 57 (81.4%). The highest cases were recorded in October 163 (53.27%) followed by September 79 (25.81%). Year 2020 was found with highest positive case 152 (49.7%). Conclusion: The present study indicated that LSD is endemic in the study area even if vaccination was given on annual bases. Therefore, the disease's effective control and prevention strategies should be implemented. Farther study should be undertaken using confirmatory diagnosis to understand its serotype and post vaccination sero-monitoring.

Key words: Belesa · Cattle · Disease · Retrospective · Risk Factors · Spatial · Surveillance · Temporal

INTRODUCTION

Ethiopia have the largest livestock population in Africa [1]. The sub-sector is playing a vital role in the economy of the country which contributes about 10% of GDP and provides employment to over 30% of the agricultural labor force [2]. Livestock also play very important roles in food security of the people [3]. There are estimated numbers of 70 million in Ethiopia and 32,134,988 million from Amhara region [1]. These animals are managed locally under extensive and semi-intensive husbandry systems. In the West Belesa district cattle are the major sources of economy that the farmers' income mainly depends on it [4].

The overall livestock production constraints in Ethiopia are feed shortages, livestock diseases, low genetic potential of indigenous livestock and lack of marketing infrastructure and water shortages [4]. Among the many other diseases, LSD is the one which can case economic losses and poor productivity in cattle in many parts of the country [5-7]. Lumpy skin disease is a generalized skin disease which is an infectious, eruptive, occasionally fatal disease of cattle caused by a virus associated with the N*ettling poxvirus* in the genus Capri poxvirus of the family *Poxviridae* [8].

Lumpy skin disease is a vector-borne pox disease caused by the *lumpy skin disease virus (LSDV),* a member of the genus *Capri poxvirus* within the family

Corresponding Author: Bayisa Kenaw, Veterinary Epidemiologist at Bureau of Agriculture Benishangul Gumuz Region Assosa, Ethiopia.

Pox viridae. Lumpy skin disease virus shares the genus with *Sheep pox virus* (SPPV) and *goat pox virus* (GPV), which is closely related, but phylogenetic ally distinct [9]. Its outbreaks occur in epidemics several years apart. Outbreaks are usually seasonal but may occur at any time because in many affected regions no season is completely vector-free. Morbidity varies between 2 and 45 percent and the mortality rate is usually less than 10 percent. Susceptibility of the host depends on immune status, age and breed. It is widespread and endemic throughout Africa, excluding Algeria, Morocco, Tunisia and Libya [10].

The economic losses due to LSD disease is associated with decreased milk production, traction power loss, weight loss, poor growth, abortion, infertility and skin damage [11, 12]. The most effective route of transmission is mechanical via biting flies and its incidence is high during wet seasons when populations of the flies are abundant and its incidence decreases during the dry season [5, 6]. The disease has a different geographical distribution in Ethiopia and it was first observed in 1983 in the North-Western part of the country at South-West of Lake Tana [13].

Problem Statement: A lot of lumpy skin disease cases have been reported from different animal health service clinics to West Belesa district Livestock and Fishery Resource Development Office. The cases have been reported for an average of 2 months in the year and it repeatedly occurred annually. The regular mass vaccination program performed in different kebeles but the trend of the disease occurrence is continued. The data related to the disease distribution and risk factors are not yet collected and analyzed from the present study area. Therefore, this study was designed to collect all the data and different risk factors to analyze the trend of the disease in the district to minimize the problems occurred due to the disease. Therefore, this study aimed to investigate the spatial and temporal distribution of the disease in the study area from 2017 to 2021 and to identify the factors contributing for the occurrence and spread of *LSD* in the study area.

MATERIALS AND METHODS

Study Area: This study was conducted in West Belesa district, which is found in Central Gondar Zone Administration, Amhara region, North-West Ethiopia. It is found at 81 km from its zonal city Gondar and 178 km far from its regional city Bahir-dar (Figure 1). It has a minimum annual average temperature 13°C and maximum average temperature 35°C with annual rainfall range from 800 mm to 1200 mm. It is found at 1800- 2100 m high above the sea level [14]. The cattle population of West Belesa district is 747,139 [1].

The study was conducted from June 2022 to September 2022 in West Belesa district (Figure 1). A retrospective surveillance study was conducted for the period from 2017 to 2021 to identify the spatial and temporal distribution case in different animal health centers of the district. Census type of sampling method was applied to collect secondary data from the total of

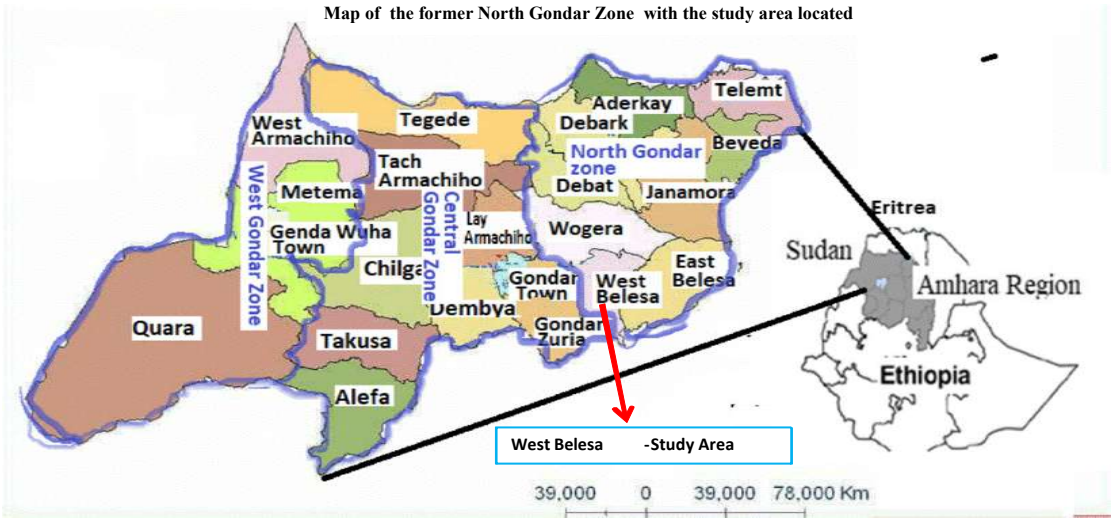


Fig. 1: Location of the study area in the map

Study setting, design and sample size determination

31 animal health centers found in west Belesa district. The data recorded in the animal health centers was diagnosed based on clinical examination. All recorded cases starting from 2017 to 2021 was assessed, but LSD case was only obtained and collected from different secondary data sources in 22 animal health centers. Data collection was done from different sources either from soft or hard copy of monthly outbreak report, case books and quarterly, three monthly, six monthly and annual reports available at each animal health centers. All available data concerning LSD was collected with the preformed data collection format on Microsoft Excel spread sheet.

Data Management and Analysis: The collected data was coded and entered Microsoft Excel spread sheet. Risk factors like; site of data collection, age, sex, season, sick, dead and management system was entered Microsoft Excel 2016 spread sheets. Then data screening was preformed and any missing data was excluded before analysis. Data validation were assessed by applying several checks to ensure the accuracy and quality of data in Microsoft Excel and 3 samples with suspected LSD cases were dropped during data evaluation and analysis because of missing values. Statistical analysis was performed by descriptive statics. The disease distributions related to different risk factors were displayed using tables and graphs.

RESULTS

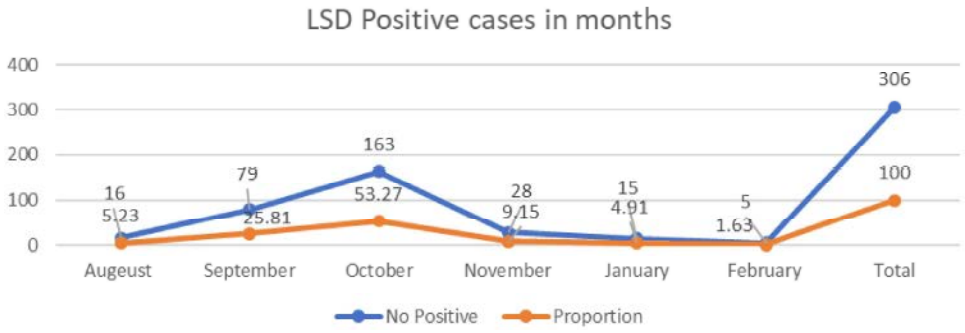
Based on clinical examination performed during the years of 2017-2021 a total of 6,1276 cattle was diagnosed at different animal health centers in West Belesa district and the prevalence of LSD was found 306 (0.5%). The mortality rate of LSD suspected cases was only 7 (2.28%) cattle.

Risk Factors: The risk factors age, sex, season, management system and place was analyzed using descriptive statistic i.e percent, mean and rage and presented by paragraphs, table and charts. Lamp skin diseases occurrence was higher in females than males. Based on age related risk factor, adults were infected more than young cattle (Table1).

The highest seasonal occurrence of LSD was recorded in October followed by September while there was no LSD case recorded from March to July (Graph 1).

The LSD occurrence was increasing from 2017 to 2020 and highest case was recorded during the year 2020 followed by 2021 (Graph 2).

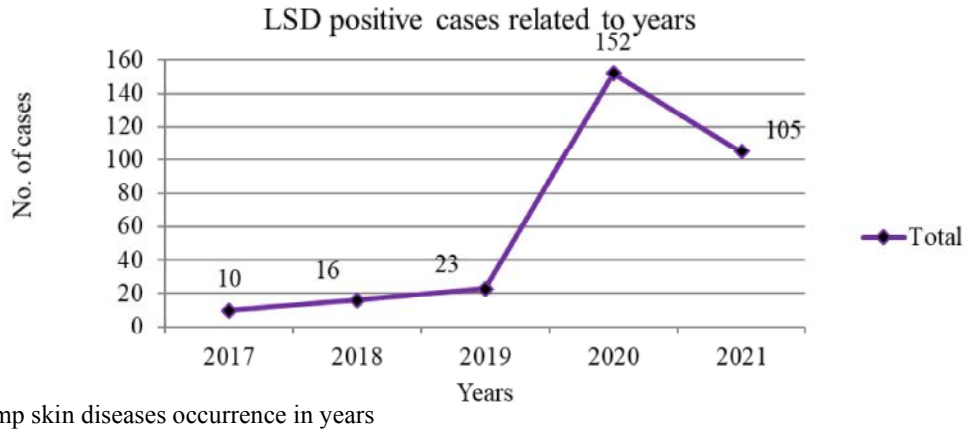
The number of LSD vaccine given was increasing from 2017-2021 and the highest vaccine was given in the year of 2021.



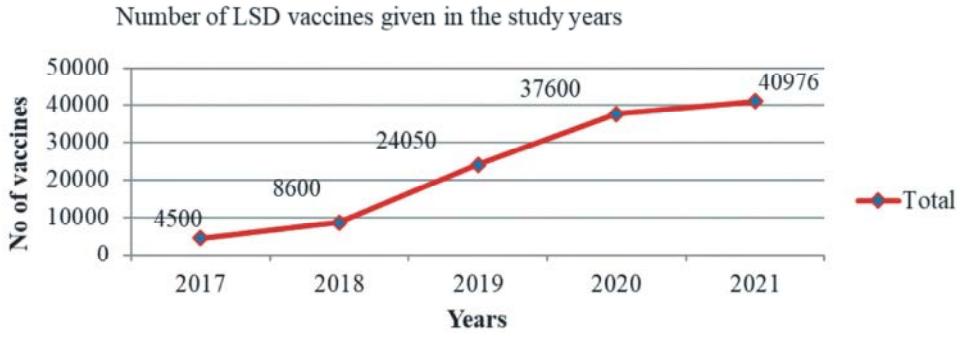
Graph 1. Number of LSD cases in months

Table 1: Sex, age and management systems as a risk factors for the occurrence of LSD

Risk factors	Variables	No. of positive cases	Percent %
Sex	Female	170	55.6
	Male	136	44.4
	Sum	306	100
Age	Adult	213	69.6
	Young	93	30.4
	Sum	306	100
Management system	Extensive	249	81.4
	Semi intensive	57	18.6
	sum	306	100



Graph 2: Lamp skin diseases occurrence in years



Graph 3: Lumpy Skin Disease vaccines given during the study period

Lumpy skin disease case was recorded from 22 different animal health center of study area with the varied proportion. The highest positive case was recorded from Abeye kebele while the smallest case record was from Labamaryam and Fenta. There was no LSD case evidence from the remaining 8 animal health centers.

DISCUSSION

An over all of 6,1276 cattle were presented to animal health centers in west Belesa district over 5 years (2017-2021) and the prevalence of LSD was found 306 (0.5%). This prevalence is lower compared to 8.1% recorded from questionnaire survey conducted to determine the distribution of LSD and associated risk factors in three main agro-climatic zones of Ethiopia [5]. It is also much lower than 11.68 and 12.2% LSD reported by [15, 16] respectively. This could be due to the present study was based on data recorded in animal health center only and all LSD infected cattle could not be presented to health centers for treatment. The mortality rate observed from present finding 2.28% was consistent with 2.12, 1.2, 2 1.92 and 1.5% that were previously reported [5, 17, 18, 15, 16] respectively.

The present study indicates that LSD was higher in females with the infection rate of 170 (55.6%). This result was consistent with the previous finding of 23.07% and 13.5% recorded from female and male respectively. This higher frequency result of LSD in female cattle could be due to their exposure to many stress conditions such as pregnancy, parturition and lactation. Adult cattle were found more infected with the infection rate of 69.6% than young 30.4% from the present finding. This finding disagrees with the reported lower infection rate of 11.9 % in adult and the higher one 18% in young [19]. This could be due to the young animals kept indoor than adults that minimize their exposure to the biting insect activities and due to immunity from their dam. Traditional calf management practices that segregate calves from the herd might have contributed to a decreased exposure risk of calves to the source of infection. Calves in the endemic area can obtain certain protective passive immunity from their dam [1]. There is a solid immunity lasting for about 3 months in calves. In out breaks very young calves, lactating and malnourished cattle develop more severe clinical disease [17].

The management system based finding of present result shows the infection rate of LSD 18.6% under semi-intensive systems and 81.4% under extensive

management. This finding is consistent with the statement that cattle can be infected by drinking water, but ingestion and direct contact transmission are not common routes, even though the virus is present in nasal and lacrimal secretions, semen and milk of infected animals. It is transmitted by insect vectors among the cattle sharing similar grazing and watering areas and those congregate in the same barn [20]. This may be due to extensively managed animals may exposed to biting flies and communal grazing and watering point resource utilization than semi-intensive management system from the present study. The highest seasonal occurrence of LSD 53.27 % in October and next 25.81 in September while there was no LSD case recorded from March to July. The highest positive case recorded in October existence of positive cases during wet and cold season in the present study is agreed with the concept [17]. This may be due to high levels of insect activity towards the end of rainy season and following rainy season.

The vaccine coverage was increasing from 2017 to 2021 and large cattle was vaccinated during the year of 2020 and 2021. In contrast to the vaccination coverage to prevent the LSD, the present finding indicates that LSD cases increases from the year 2017 to 2020 and slightly decrease in the year 2021. This may perhaps due to uncontrolled livestock movement from unvaccinated to the vaccinated area in the earlier year and vaccine cold chain could not be properly handled. Good understanding of epidemiology, economic significance and control mechanisms of the disease enable to design suitable control measures. Effective control measure of the disease is achieved through mass vaccination though separation and culling of infected animals [20].

The present finding shows the evidence of LSD occurrence in 22 out of total 32 kebeles found in west Belesa district. This could be due to ecological difference that determine for the availability of the biting flies. The warm and humid climate in midland and lowland agro-climates has been considered as more favorable environment for the occurrence of large populations of biting flies than the cool temperature in the highlands [21]. The proportion of LSD in the three agro-ecological zones were 28, 44 and 48% from highland, midland and lowland respectively [22].

CONCLUSSION

The present retrospective study indicated that LSD is an endemic disease in West Belesa district. This was the first study to describe the spatial and temporal distribution of the disease which is starting point for developing the future effective disease surveillance, control and prevention measures. The study indicated that 306 LSD positive cases were found in five years period across different area of the district. The age, sex, management systems, seasons and years of occurrence were risk factors. The LSD was more found from females, adults and extensively managed cattle. The disease occurrence was found higher following the end of the rainy season at September and October. The LSD was found spreading in most of the Kebeles in the district. Therefore, Vaccination should be given before the season of the disease occurrence. Cattle management should be improved from extensive to semi-intensive and intensive management systems to prevent an exposure to biting flies. Farther study should be undertaken using confirmatory diagnosis to understand its serotype and post vaccination sero-monitoring.

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REFERENCES

1. CSA (Central Statistical Authority),2022. Federal democratic republic of Ethiopia, Agricultural Sample Survey: Report on Livestock and livestock characteristics, Addis Ababa: 2: 1-38.
2. Latera, S., I. Nuraddis and T. Mathewos, 2016. Prevalence of Gastro-intestinal Helminthes Parasite of Cattle in Ejere District, West Shoa, Oromiya Region, Ethiopia. World Journal of Agricultural Sciences, 12(5): 364-371.
3. FAO (Food and Agriculture Organization of United Nations), 2018. African Sustainable Livestock 2050: Livestock and Livelihoods Spotlight, cattle sectors in Ethiopia, pp: 1-11.
4. Abera, Z., H. Degefu, G. Gari and M. Kidane, 2015. Sero-prevalence of Lumpy Skin Disease in selected districts of West Wollega Zone. BMC Veterinary Research, 11(135): 1-9.
5. Gari, G., S.A. Waret, V. Grosbois, P. Jacquiet and F. Roger, 2010. Risk factors associated with observed clinical lumpy skin disease in Ethiopia. Epidemiol Infection, 138(11): 1657-1666.

6. Gari, G., V. Grosbois, S.A. Waret, S. Babiuk and P. Jacquiet, 2012. Lumpy skin disease in Ethiopia: Sero-prevalence study across different agro-climate zones. Acta Tropica, 123(2): 101-106.5.
7. Birhanu, H., G. Getachew, T. Tadele, B. Belay and T. Teshale, 2015. Study on the Epidemiological and Financial Impacts of Clinical Lumpy Skin Disease in Selected Districts of Tigray and Afar Regional States, North Eastern Ethiopia. International Journal of Current Research, 7(6): 17415-17425.
8. Ahmed, W.M. and K.S. Zaher, 2008. Observations on Lumpy Skin Disease in local Egyptian cows with emphasis on its impact on ovarian function. African Journal Microbiology Research, 2(10): 252-257.
9. DACAE (Drug Administration and Control Authority of Ethiopia), 2006. Standard Veterinary Treatment Guidelines for Veterinary Clinic.1st edition, Addis Ababa, Ethiopia, pp: 69-70.
10. FAO (Food and Agriculture Organization of United Nations), 2017. Lumpy Skin Disease, A field Manual for Veterinarians, pp: 3-15.
11. Yacob, H., B. Nesanet and A. Dinka, 2008. Part II: Prevalence of major skin diseases in cattle, sheep and goats at Adama Veterinary Clinic, Oromia regional state, Ethiopia. Revue Veterinary Medicine, 59(8): 455-461.
12. OIE (World Organization for Animal Health), 2010. Lumpy skin disease, manual of diagnostic tests and vaccines for terrestrial animals. Paris. Office International des Epizooties, pp: 1-13.
13. Mebratu, G., B. Kassa, Y. Fikre and B. Berhanu, 1984. Observations on the outbreak of lumpy skin disease in Ethiopia. Rev.Elev. Méd. vét. Pays trop, 37(4): 395-399.
14. WBDGCAO (West Belessa District Government Communication Affairs Office), 2018. Werk Amba, the environmental magazines focusing on the district activities. Arbaya: Gondar prin press, 16(12): 2-3.
15. Umer, S.G., A.M. Ahmedin, A.U. Munera and S.K. Melaku, 2024. "Molecular Detection and Isolation of Lumpy Skin Disease Virus during an Outbreak in West Hararghe Zone, Eastern Ethiopia, Veterinary Medicine International, vol. 2024, Article ID 9487970, 9 pages, https:// doi.org/ 10.1155/ 2024/ 9487970.
16. Girma, Z., M. Bedaso, G. Esayas, G. Belayneh and B. Berecha, 2019. Isolation and Molecular Characterisation of Lumpy Skin Disease Virus from Diary Farms of Central Ethiopia. World Applied Sciences Journal, 37(9): 764-775. DOI: 10.5829/ idosi.wasj.2019.764.775.
17. Radostits, O., M.C.C. Gay, K.W. Hinchcliff and P.D. Constable, 2007. A textbook of the diseases of cattle, horses, sheep, pigs and goats.10th edition. London: Elsevier Saunders publishing, pp: 1424-1426.
18. Arjkumpa, O., S. Minta, B. Manoch, P. Issara, L. Supawadee, L. Patchariya, L. Chayanun, S. Chaiwat, K. Noppasorn, P. Pawares, U. Ponkrit, B. Noppawan, S. Chalutwan and P. Veerasak, 2022. The First Lumpy Skin Disease Outbreak in Thailand, its epidemiological Features and Spatial-Temporal Analysis. Journal of Frontiers in Veterinary Science, 8(79906): 1-10.
19. Ayelet, G., R. Haftu, S. Jemberie, A. Belay, E. Gelaye, B. Sibhat, E. Skjerve and K. Asmare, 2014. Lumpy skin disease in cattle in central Ethiopia: Outbreak investigation and isolation and molecular detection of the virus. Rev. sci. tech. Off. int. Epiz, 33(3): 877-887.
20. Abeya, A., B. Feyisa, A. Gezali and A. Derej, 2018. Review on Epidemiological Aspects and Economic Impact of Lumpy Skin Disease. Dairy and Vet Sci Journal, 7(4): 555716. DOI: 10.19080/ JDVS.2018.07.555716.
21. Gumbe, A.A.F., 2018. Review on lumpy skin disease and its economic impacts in Ethiopia. J Dairy Vet Anim Res.;7(2):39–46. DOI: 10.15406/ jdvar.2018.07.00187.
22. Nebyou, M., S. Adane, H.G. Gizachew, S. Dereje, G. Ferrara and S. Montagnaro, 2023. Sero-Epidemiology of Lumpy Skin Disease and Determine Community Awareness Level about LSD in Different Agro-Ecological Zones of Sidama Regional State, Southern Ethiopia. Preprint.org doi: 10.20944/ preprints11. 1832.v1.